

REMARKS

The Examiner's Office Action mailed March 22, 2006 has been reviewed. Claims 1-48 are pending in this application. In view of the following arguments, Applicants respectfully submit that the application is now in condition for allowance.

Objections to the Specification

The Examiner objected to the disclosure because the numerals "450" and "510" were both used to designate "arm positioners". Applicants have amended paragraph 0117 to correct this reference. Withdrawal of this rejection is respectfully requested.

Rejections under 35 U.S.C. § 112.

The Examiner rejected claim 11 under 35 U.S.C. § 112, 1st paragraph, as failing to comply with the enablement requirement. The Examiner rejected claim 11 because the specification and/or drawings do not disclose a steering assembly that is actuated between the steering and non-steering position by rotation of the shaft in addition to having an actuator supported by the frame adapted to exert a radial force on a borehole-engaging member when in the steering position. Applicants respectfully request reconsideration of this rejection.

Figure 4 of Applicants' disclosure and its accompanying text teaches an embodiment of the present invention having a steering assembly 88 moveable between a steering position and a non-steering position in response to rotation of the shaft 116. The apparatus of FIG. 4 also shows, an actuator 102 supported by the frame 90 and adapted to exert a radial force on the borehole engaging member 92 via scissor linkage 94 when the actuator is operated. One skilled in the art will appreciate that the actuator 102 may exert

radial force on the borehole engaging member 92 to force the cutting member 38 upward (as shown in Fig. 4) while the steering assembly 88 is in a steering position. Accordingly, Applicants respectfully request withdrawal of this rejection.

Rejections under 35 U.S.C. § 102(a)

The Examiner rejected Claims 12, 22, 29-33, 41 and 48 under 35 U.S.C. § 102(a) as anticipated by Rankin et al. (U.S. Pub. No.: 2002/0096362). Reconsideration of this rejection is respectfully requested.

Applicants' independent claim 12 is directed to a horizontal directional drilling system used to make a generally horizontal borehole. The system comprises a rotary drive system, a drill string having a first end and a second end, and a guidable reamer assembly. The first end of the drill string is operatively connected to the rotary drive system. The guidable reamer assembly comprises a cutting member, a support member having a central longitudinal axis, and a steering assembly. The cutting member has a central longitudinal axis and is operatively connectable with the drill string for rotation therewith. The steering assembly is moveable between a steering position and a non-steering position and adapted to laterally offset the central longitudinal axis of the cutting member from the longitudinal axis of the support member when the steering assembly is in the steering position.

Applicants' independent claim 29 is directed to a method for reaming a borehole with a horizontal directional drilling system using a reamer assembly. The reamer assembly has a central longitudinal axis and a support member having a central longitudinal axis. The method comprises sensing a deviation in the borehole, laterally displacing the longitudinal axis of the cutting member relative to the longitudinal axis of

the support member to remove the deviation from the borehole, and rotating and axially advancing the cutting member.

Independent claim 33 is directed to a horizontal directional drilling system comprising a rotary drive system, a drill string having a first end and a second end, and a guidable reamer assembly. The first end of the drill string is operatively connected to the rotary drive system. The guidable reamer assembly comprises a cutting member and a steering assembly. The cutting member has a central longitudinal axis, connectable with the drill string for rotation therewith. The steering assembly has a central longitudinal axis and is movable between a steering position and a non-steering position. The steering assembly is adapted to laterally offset the central longitudinal axis of the cutting member from the longitudinal axis of the steering assembly when in the steering position.

Applicants' independent claim 48 is directed to a guidable reamer assembly for use in horizontal directional drilling operations. The reamer assembly comprises a cutting member, a support member, and a steering assembly. The cutting member and support member each have a central longitudinal axis. The steering assembly is moveable between a steering position and non-steering position and is adapted to laterally offset the central longitudinal axis of the cutting member from the longitudinal axis of the support member when the steering assembly is in the steering position.

Each of these independent claims requires a steering assembly adapted to laterally offset the longitudinal axis of a cutting member from the longitudinal axis of a support member when the steering assembly is in the steering position.

Rankin discloses a steerable reamer that has a steering assembly movable between a steering and non-steering position. Rankin discloses a steering assembly that pivots or rotates around a point for steering purposes. As discussed below, this movement does not laterally offset the longitudinal axis of the cutting member from the longitudinal axis of the support member.

In Rankin, the positioning elements 332 can be extended or retracted. The variation in length of the positioning elements 332 will cause the frame (328 or 328a) to pivot about the pivot point (330 or 330a) relative to the housing 310. (See Rankin, at Figures 5-9 and ¶ 0065). This has the effect of changing the orientation of the axis of rotation of the shaft (324 or 324a) relative to the axis of the elongated housing section (312 or 312a). If a discontinuity is encountered, the reamer section 320 will pivot about the pivot point 330 to change the orientation of the reamer 322. (See Rankin at ¶ 0069). Thus, the steering assembly disclosed in Rankin rotates or pivots the cutting member relative to the housing. Accordingly, Rankin does not teach a steering assembly that laterally offsets the central longitudinal axis of the cutting member from the longitudinal axis of the support member as required by Applicants' independent claims 12, 29, 33 and 48 and the Section 102(a) rejection of these claims must be withdrawn.

Claim 22 depends from claim 12 and includes all of its limitations, claims 30-32 depend from claim 29 directly or indirectly and include all of its limitations, and claim 41 depends from claim 33 and includes all of its limitations. Thus, the Section 102 (a) rejection of claims 22, 30-32, and 41 must likewise fail.

Rejections under 35 U.S.C. § 102(b)

The Examiner rejected Claims 1, 2, 7, 12, 22, 29-33, 41 and 48 under 35 U.S.C. § 102(b) as being anticipated U.S. Patent No. 5,957,222 issued to Webb et al. (hereinafter “Webb”). Reconsideration of this rejection is respectfully requested.

Applicants’ independent claim 1 is directed to a guidable reamer assembly for use in horizontal directional drilling operations. The reamer assembly comprises a cutting member having a central longitudinal axis, a support member having a central longitudinal axis, a movable shaft, and a steering assembly. The steering assembly is moveable between a steering position and a non-steering position in response to rotation of the movable shaft. The steering assembly is also adapted to laterally offset the central longitudinal axis of the cutting member from the longitudinal axis of the support member when the steering assembly is in the steering position. Thus, like independent claims 12, 29, 33 and 48, claim 1 requires lateral offset of the central longitudinal axis of the cutting member relative to the longitudinal axis of the support member when the steering assembly is in the steering position. Webb does not teach this feature of Applicants’ invention.

Webb teaches a directional drilling system for drilling a borehole. The system disclosed in Webb includes an assembly for steering a drill bit and not a system for guiding a backreamer through a borehole. The steering assembly of Webb uses a cam member 223 to cause the housing 451 to tilt relative to the axis of a shaft 101 for steering purposes. (See Webb col. 12:25-27.) The shaft 101 is allowed to rotate within the housing 451 and the housing is allowed to tilt relative to the shaft 101 due to a ball joint 471. (See Webb col. 12:37-39.) Thus, Webb does not teach lateral offset of a

backreamer cutting member relative to the central longitudinal axis of the support member as required by Applicants' claims 1, 12, 29, 33 and 48 and the Section 102(b) rejection of these claims must be withdrawn.

Claims 2 and 7 depend either directly or indirectly from claim 1 and include all of its limitations, claim 22 depends from 12 and includes all of its limitations, claims 30-32 depend directly or indirectly from claim 29 and include all of its limitations, and claim 41 depends from claim 33 and includes all of its limitations. Therefore, the Section 102(b) rejection of claims 2, 7, 22, 30-32, and 41 must likewise fail.

The Examiner rejected Claims 1-9, 12, 22-24, 29, 31-33, 41-43 and 48 under 35 U.S.C. § 102 (b) as being anticipated by U.S. Patent No. 6,244,361 issues to Comeau et al. (hereinafter "Comeau"). Reconsideration of this rejection is respectfully requested.

As discussed herein independent claims 1, 12, 29, 33, and 48 all require lateral offset of the central longitudinal axis of the cutting member relative to the longitudinal axis of the support member when the steering assembly is in the steering position. Comeau does not teach this feature of Applicants' invention.

Comeau discloses a drilling direction control device used to steer a drill bit. The drill bit is supported at the end of a drilling shaft that passes through a housing 46. The drill bit is reoriented for steering by tilting the bit. The bit is tilted using rings (156, 158) supported within the housing and around the drilling shaft to bend the drilling shaft about a fulcrum bearing 88. Bending the drilling shaft causes the drill bit to tilt or pivot about fulcrum 88 relative to the housing 46. (See Comeau col. 26:30-34.) Comeau does not, however, teach lateral offset of the central longitudinal axis of a

backreamer cutting member from the longitudinal axis of the support member as in Applicants' claims 1, 12, 29, 33 and 48 and the Section 102(b) rejection of these claims must be withdrawn.

Dependent claims 2-9 depend directly or indirectly from claim 1 and include all its limitations; claims 22-24 depend directly or indirectly from claim 12 and include all its limitations; claims 31-32 depend directly from claim 29 and include all its limitations; and claims 41-43 depend directly or indirectly from Claim 33 and include all its limitations. Therefore, the Section 102(b) rejection of claims 2-9, 22-24, 31-32 and 41-43 must likewise be withdrawn.

Claim Rejections under 35 U.S.C. § 103

The examiner rejected claims 10, 25 and 44 under 35 U.S.C. § 103(a) as being unpatentable over Comeau. Applicants respectfully request reconsideration of this rejection.

Claim 10 depends from claim 1, claim 25 depends from claim 22, and claim 44 depends from 33. As discussed above, independent claims 1, 12, and 33 are patentable over Comeau because Comeau does not teach or suggest lateral offset of the central longitudinal axis of a backreamer cutting member from the longitudinal axis of the support member as in Applicants' claims 1, 12, and 33. Thus, Comeau cannot support a prima facie showing of obviousness, and the Section 103(a) rejection of claims 10, 25 and 44 must be withdrawn.

The examiner rejected claims 23, 24, 42 and 43 under 35 U.S.C. § 103(a) as being unpatentable over Rankin or Webb in view of the U.S. Publication

No. 2002/0066598 to Rozendaal et al. (hereinafter “Rozendaal”). Applicants respectfully request reconsideration of this rejection.

Claims 23 and 24 depend either directly or indirectly from claim 12 and claims 42 and 43 depend either directly or indirectly from claim 33. As discussed above, claims 12 and 33 are patentable over Rankin because Rankin teaches pivoting the cutting member relative to the support member and over Webb because Webb teaches tilting of the cutting member relative to the support member. Applicants’ claims 12 and 33 require lateral offset of the central longitudinal axis of the cutting member from the longitudinal axis of the support member. Rozendaal does not supply this missing feature.

Rozendaal teaches a reamer that may be steerable using an offset mount 43 rotatably coupled to the cutting body 2 (Figures 5-7). The offset mount is adapted to connect to a ream string 31 and offsets the longitudinal axis of the ream string from the axis of rotation of the cutting body 2. However, the offset mount of Rozendaal is not movable between a steering position and a non-steering position. The combination of Rankin or Webb and Rozendaal would result in a reamer assembly having a cutting member with a longitudinal axis that intersects the longitudinal axis of the ream string of Rozendaal. The offset mount of Rozendaal simply shifts the location of the longitudinal axis of the offset mount relative to the axis of the cutting member. Thus, Rozendaal does not teach or suggest lateral offset of the central longitudinal axis of the cutting member from the longitudinal axis of the support member. Accordingly, the combination of Rankin or Webb and Rozendaal cannot support a prima facie showing of obviousness as to claims 12 and 33, and the Section 103(a) rejection of claims 23, 24, 42, and 43 must fail.

The examiner rejected Claims 23-25 and 42-44 under 35 U.S.C. § 103(a) as being unpatentable over Rankin or Webb in view of U.S. Patent No. 5,429,198 issued to Anderson et al. (hereinafter "Anderson"). Reconsideration of this rejection is requested.

Claims 23-25 depend from claim 12 and claims 42-44 depend from claim 33, which have been shown to be patentable over Rankin because Rankin teaches pivoting the cutting member relative to the support member and over Webb because Webb teaches tilting of the cutting member relative to the support member. Anderson does not supply this missing feature.

Anderson is directed to stabilizers used to support a reamer within a tunnel. The stabilizer of Anderson may be either a rotatable tire or a shoe assembly biased against the wall of the tunnel by a pressurized piston. Anderson does not teach or disclose a guidable reamer assembly having a steering assembly movable between a steering position and a non-steering position and adapted to laterally offset the central longitudinal axis of the cutting member from the longitudinal axis of the support member when the steering assembly is in the steering position. Accordingly, the combination of Rankin or Webb and Anderson does not support a prima facie showing of obviousness as to claims 12 and 33. Claims 23-25 depend from claim 12 and claims 42-44 depend from claim 33 and are for the same reasons allowable. The obviousness rejection as to these claims should be withdrawn.

The examiner rejected Claims 28 and 46 under 35 U.S.C. § 103(a) as being unpatentable over Rankin in view of U.S. Publication No. 2003/0152428 to

Wentworth et al. (hereinafter "Wentworth"). Reconsideration of this rejection is requested.

Claim 28 depends from claim 22 and claim 46 depends from claim 33, both of which have been shown to be patentable over Rankin because Rankin teaches pivoting the cutting member relative to the support member and over Webb because Webb teaches tilting of the cutting member relative to the support member. Wentworth does not disclose this missing feature.

The Examiner cites Wentworth to show a beacon within a housing in the drill string that senses the orientation of the drill string. However, Wentworth does not teach or suggest a guidable reamer assembly having a steering assembly movable between a steering position and a non-steering position. Wentworth teaches the use of a reamer having an impact device to back ream a pilot borehole. The reamer of Wentworth may have an asymmetrical reamer face that is used to steer the reamer through the pilot bore. Wentworth, however, does not teach or suggest moving the steering assembly to a steering position so that the central longitudinal axis of the cutting member is laterally offset from the longitudinal axis of the support member as in claims 22 and 33. Thus, the combination of Rankin and Wentworth cannot support a prima facie showing of obviousness, and the Section 103 rejection of claims 28 and 46, which depend from claims 22 and 33, respectively, must be withdrawn.

The Examiner rejected claim 47 under 35 U.S.C. § 103(a) as being unpatentable over Rozendaal in view of the German document '992 to Bergwerksverband GMBH (hereinafter "DE '992"). Reconsideration of this rejection is requested.

Independent Claim 47 is directed to a horizontal directional drilling system comprising a rotary drive system, a drill string, and a guidable reamer assembly. The drill string has a first and second end and comprises a moveable hollow outer member and an inner member positioned longitudinally therein. The inner member is independently rotatable of the outer member. The first end of the drill string is operatively connected to the drive system. The guidable reamer assembly is operatively connected to the second end of the drill string and comprises a cutting member and a steering assembly. The cutting member is operable in response to rotation of the inner member of the drill string and the steering assembly is operable in response to the movement of the outer member of the drill string.

Rozendaal discloses a drilling system with a drill string 9 coupled to a drive shaft 3 on its front end 7. It uses a separate ream string 31 controlled by a second drilling machine positioned at the borehole exit end and offset from the longitudinal axis of the drill string 9 to adjust the attitude of the backreamer 1, while manipulating the cutting member 19 by use of the drill string 9. The ream string 31 is connected on one end to an anchoring machine 33 (Fig. 3) which slides the ream string longitudinally to steer the reamer. The drill string 9 is connected at the other end of the borehole to a drilling machine 35. Thus, Rozendaal discloses a reamer that requires manipulation of the drill string 9 and the ream string 31 together to steer the reamer and does not teach a guidable reamer having a steering assembly or that the guidable reamer's steering assembly is operated in response to movement of the outer member of the drill string. DE '992 does not supply this missing feature.

The Examiner cites DE '992 to show a drill string with an inner member for rotating a cutter and an outer member for rotating a steering assembly. However, DE '992 does not teach or suggest a horizontal directional drilling system that has a guidable reamer assembly comprising a steering assembly operable in response to movement of the outer member of the drill string. Rather, the steering mechanism in DE '992 is positioned in the drill string and not as part of the guidable reamer assembly as required by Applicants' claim 47. Thus, the combination of Rozendaal and DE '992 cannot support a prima facie showing of obviousness, and the Section 103 rejection of this claim must fail.

Applicants submit that the application, as amended herein, is now in condition for allowance. A Notice of Allowance courteously is solicited. In the event that there are any questions or comments concerning this amendment or response, the Examiner is invited to contact the undersigned.

This is intended to be a complete response to the Office Action mailed March 22, 2006.

Respectfully submitted,



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